FINAL ORAL EXAMINATION
FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

OF

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SCHOOL OF HUMAN NUTRITION

CHANGES IN BODY COMPOSITION AND EATING BEHAVIORS IN 6- TO 8-YEAR-OLD CHILDREN WITH OBESITY PARTICIPATING IN A FAMILY-CENTERED LIFESTYLE INTERVENTION: RESULTS FROM A 1 YEAR RANDOMIZED CONTROLLED TRIAL

October 23, 2017
9:15 am

Raymond Building, Room R3-037.
McGill University, Macdonald Campus

COMMITTEE:
Dr. Frances Aboud (Pro-Dean) (Department of Psychology)
Dr. T. Johns (Chair) (School of Human Nutrition)
Dr. H. Weiler (Supervisor) (School of Human Nutrition)
Dr. S. Kubow (Internal Examiner) (School of Human Nutrition)
Dr. H. Ramiro Melgar-Quinonez (Internal Member) (School of Human Nutrition)
Dr. S. Burgos (External Member) (Department of Animal Science)

Dr. Josephine Nalbantoglu, Dean of Graduate and Postdoctoral Studies
Members of the Faculty and Graduate Students are invited to attend
ABSTRACT

**Background:** Childhood obesity is a complex disease. It stems from different etiologies and can cause a multitude of health consequences, including altered musculoskeletal health, placing these children at an increased risk of fractures. Both pathological and environmental factors, including eating behaviors, influence a child’s weight. Interventions aimed at reducing adiposity in children with obesity should be family-centered and focus on achieving sustainable reductions in adiposity while supporting bone health. Further, interventions should focus on changes in lifestyles: the role of physical activity (PA) in achieving and maintaining a healthy weight is established, as is the role of weight-bearing types of activities on bone health. Research has established the role of milk and milk products in achieving optimal bone development, whereas their role in modulating long-term changes in adiposity are not clear. The global aims of this dissertation were to test the effects of increased milk and milk products and weight-bearing types of PA on changes in: (1) body composition; (2) bone outcomes and biomarkers of bone health; and (3) eating behaviors and plasma leptin, in children with obesity participating in a 1 year (y) family-centered lifestyle intervention.

**Methodology:** Data are from the McGill Youth Lifestyle Intervention with Food and Exercise (MY LIFE) study, a 1 y randomized controlled trial that took place in Greater Montreal, Quebec. Eligibility included healthy children classified as overweight or obese as per the World Health Organization. Children (n = 78; ages 6– 8.5 y) were randomized to one of three groups: control (Ctrl: no intervention); standard intervention (StnTx: 2 servings of milk and milk products/ day (d); meet PA guidelines) or modified intervention (ModTx: 4 servings of milk and milk products/ d; meet PA guidelines plus daily weight-bearing types of PA). Study visits occurred every 3 months for 1 y; interventions were held once a month for 6 months with a follow-up session at the end of the 8th month. Interventions were based on Canada’s Food Guide to Healthy Eating (CFG) and Canadian PA guidelines and individualized to meet the needs of the family. Ctrl received counseling after 1 y; all families were taught the basics of CFG and PA guidelines at baseline. Fasting blood samples were collected for various outcomes (e.g., bone formation and bone resorption biomarkers and plasma leptin). Anthropometry were measured; body mass index-for-age and sex z-scores (BAZ) were calculated. Dual-energy x-ray absorptiometry scans were performed for: percent body fat (%BF), fat mass (FM), trunk FM, lean mass. Whole body (WB), lumbar spine (LS) and lumbar lateral spine (LLS) were measured for bone mineral content (BMC) and bone mineral density (BMD) (including z-scores). Parents completed the Children’s Eating Behavior Questionnaire, reported on diet (3-day food diary) and were surveyed on PA and sedentary behaviors of their child. Fatty acids measured in erythrocytes by gas chromatography were used to assess compliance to the milk and milk product intervention during the first 6 months.
Results: (Aim 1) Baseline anthropometry did not differ among groups. At 12 months, all groups increased height (p<0.001) and lean mass (p<0.001), however BAZ was significantly lower in ModTx (p<0.001); %BF was also lower in ModTx (p=0.02), but not in StnTx (p=0.99) or Ctrl (p=0.99). FM, waist circumference and trunk FM all significantly increased in Ctrl (p<0.001). ModTx significantly decreased erythrocyte fatty acids related to milk product intake by 6 months (p<0.05). (Aim 2) Compared to baseline, 12 month measures of BMC in WB, LS, and LLS had significantly increased among all groups (p<0.001). However, WB BMD z-scores were significantly lower in Ctrl at 12 months compared to baseline (p<0.05), whereas BMD for WB and LLS were significantly increased in StnTx and ModTx (p<0.001) but not in Ctrl. Bone biomarkers did not change over time among groups. (Aim 3) Compared to baseline, at 6 months ModTx significantly reduced Food Responsiveness, Desire to Drink and scores categorized as Food Approach (p<0.05). Plasma leptin concentrations were lower in ModTx (p=0.04) at 6 months compared to baseline, but did not differ at 12 months among groups.

Conclusion: Participating in a family-centered lifestyle intervention that focused on Canadian dietary and PA guidelines had positive effects on reducing adiposity while maintaining bone health in children with obesity. Further, this study yielded favorable changes in eating behaviors. This study suggests that in this pediatric population, the use of national guidelines as a template for intervention platforms are appropriate, but need to be individualized to meet the needs of the family.
CURRICULUM VITAE

UNIVERSITY EDUCATION

2011/1–2017/8 PhD, Human Nutrition, McGill University, Montreal, Canada.

2006/9–2009/8 MSc, Human Nutrition, McGill University, Montreal, Canada.

2002/9–2005/12 BSc, Nutritional Science, Dietetics Major, McGill University, Montreal, Canada.

EMPLOYMENT

2013/9-2013/12 Teaching Assistantship: Stage Level 4 (NUTR 510), McGill University.

2012/9-2012/12 Course Co-Instructor: Health and Wellness (EDKP 292), Kinesiology and Physical Education, McGill University.

2011/1-2011/4 Course Co-Instructor: Nutritional Assessment (NUTR 436), School of Nutrition, McGill University.

2009/1-2010/12 Clinical Coordinator, School of Human Nutrition, McGill University.

2006/1–2009/12 Teaching Assistantship: Clinical Nutrition I/II (NUTR 344/545), School of Human Nutrition, McGill University.

2007/1–2007/12 Community Dietitian, CLSC Lac-Saint-Louis, Pointe-Claire, Quebec.

2006/1–2006/12 Clinical Dietitian, Lakeshore General Hospital, Pointe-Claire, Quebec.

AWARDS

2012-17 Canadian Institutes of Health Research (CIHR): Fredrick Banting and Charles Best Doctoral Research Award.

2013 GREAT Travel Award: School of Human Nutrition, McGill University.

2012 Graduate Research Enhancement and Travel Award, McGill University.

2011 Walter M. Stewart Postgraduate Scholarship in Agriculture, McGill University.

2010 Provost Graduate Fellowship, School of Nutrition, McGill University.

2009 Master’s Award in Applied Population and Public Health Research, Canadian Public Health Association, Canadian Institute for Health Information and Government of Canada.

2005 Provost Graduate Fellowship, School of Nutrition, McGill University.
**PUBLICATIONS**

**Published:**

**Cohen TR**, Hazell TJ, Vanstone CA, Rodd C, Weiler HA. Bone health is maintained, while fat mass is reduced in pre-pubertal children with obesity participating in a 1-year family-centered lifestyle intervention. 2017, Cal Tissue Int (2) https://doi.org/10.1007/s00223-017-0318-8.


Weiler HA, Jean-Philippe S, **Cohen TR**, Vanstone CA, Agellon S. Depleted iron stores and iron deficiency anemia associated with reduced ferritin and hepcidin and elevated soluble transferrin receptors in a multiethnic group of preschool-age children. Appl Physiol Nutr Metab. 2015, 40(9):887-94.


**Under peer-review:**

Cohen TR, Hazell TJ, Vanstone CA, Rodd C, Weiler HA. Changes in eating behavior and plasma leptin in 6- to 8-year-old children with obesity participating in a family-centered lifestyle intervention in Montreal, Quebec, Canada.

**PRESENTATIONS**

**Oral Presentations**


**Poster Presentations**

Cohen TR, Hazell TJ, S Loiselle, P Kasvis, CA Vanstone, N Kim, C Rodd, H Weiler. A family-centered lifestyle intervention focused on milk and alternatives reduces adiposity in sex to eight y old overweight and obese children compared to control: Results at six months from a RCT. Pediatr Child Health June 2014.


Loiselle SE, Cohen TR, Kasvis P, Catherine A. Vanstone CA, Rodd C, Dr Hugues Plourde H, Weiler HA. Identification of nutrition and physical activity goals associated with reduction of adiposity: Results at 6-months from a family-based lifestyle intervention in overweight and obese children 6-12 years of age. CFDR June 2014.

